THE EFFECT OF AEROBIC EXERCISE ON FRAILITY

Liu, HL, Graber, TG, Thompson, LT

Physical Medication and Rehabilitation, University of Minnesota

This project was funded by: University of Minnesota Center for Excellence in Critical Care grant; and by the National Institutes of Health/National Institute on Aging grants: Ferguson-Stegall and in part Graber as fellows on T32AG029796 (Thompson, Ferrington), F31AG044108 (Graber), and R01AG017768 (Thompson).

The protocol of this study has been approved by the Institutional Animal Care and Use Committee (IACUC) in University of Minnesota.

Background and purpose: Frailty is a clinical syndrome developed during aging. The model of aging mouse is a well-known research tool for investigating molecular and cellular processes of frailty. The purpose of this study is to investigate the effect of aerobic exercise in prevention and treatment of age-related frailty using mouse-specific analogues of the criteria specified as clinical human measurements of frailty. We hypothesized that frailty can be prevented or reversed by one-month aerobic exercise, which is evaluated by Frailty Index and Frailty Intervention Analysis Value (FIAV) in mice.

Subjects: Eleven 28-month-old C57BL6 male mice and five 6-8-month-old adult mice. Material/Methods: The mice were singly housed with running wheels for 4 weeks. Each mouse was evaluated before and after intervention by Frailty Index based on four clinical relevant criteria: grip strength, walking speed, endurance score and physical activity. In addition, a composite score, the FIAV, was also developed to evaluate the efficacy of the treatment (aerobic exercise) to improve the Frailty Criteria at the individual mouse level.

Analyses: The differences within age group are tested by paired t-test whereas the differences between age groups are evaluated by unpaired t-test (p < 0.05).

Results: Two old mice were identified as frail before the intervention; however, they were not frail following the intervention. The mean FIAV demonstrated marked improvement in both groups. The adult mice demonstrated a far greater positive response to the exercise (p < 0.001).

Conclusions: Aerobic exercise reversed frailty and improved functional performance in old and adult mice. In addition, the FIAV proved to be a valuable tool to evaluate the treatment effects by quantifying the changes in frailty criteria at the individual mouse level.

Implications/ Clinical Relevance: The aerobic exercise as a potential prevention and treatment for frailty.